

TABLE 4.—Weather conditions at Bluefields, Nicaragua, at a. m. and p. m. observations, October 12-18, 1926 (From Form 1001 A)

Day and hour	Barometer	Temperature	Wind direction	Velocity	Weather	Rainfall
	Inches	°		M. p. h.		Inches
12th, a.	29.88	75	w.	4	Cloudy	.57
12th, p.	29.88	80	0.	0	Partly cloudy	.00
13th, a.	29.88	76	nw.	2	Cloudy	.53
13th, p.	29.88	81	nw.	2	Partly cloudy	.06
14th, a.	29.86	76	w.	4	Cloudy	.12
14th, p.	29.88	78	nw.	2	do.	.10
15th, a.	29.79	76	nw.	6	do.	.61
15th, p.	29.88	76	w.	2	do.	.15
16th, a.	29.70	75	w.	10	Rain	1.47
16th, p.	29.86	77	nw.	2	do.	1.00
17th, a.	29.88	75	sw.	6	Cloudy	.00
17th, p.	29.77	82	sw.	4	do.	.00
18th, a.	29.86	75	sw.	4	do.	.00
18th, p.	29.84	80	sw.	4	Rain	.07

LITERATURE CITED

- (1) Chapel, L. T. Winds and storms on the Isthmus of Panama. M. W. R., vol. 55, December, 1927. Pp. 519-530.
 (2) Mitchell, Charles L. West Indian hurricanes and other tropical cyclones of the North Atlantic Ocean. M. W. R., Sup. No. 24, 1924.
 (3) Hurd, Willis Edwin. The North Atlantic hurricane of October 13-29, 1926. H. O. Pilot Chart, North Atlantic Ocean, October, 1930.

"SAN NICOLÁS"—THE TROPICAL STORM OF SEPTEMBER 10, 1931, IN PORTO RICO

By F. E. HARTWELL

[Weather Bureau, San Juan, P. R.]

According to the accustomed nomenclature of West Indian storms the one which raked the north coast of Porto Rico on the night of September 10 has been named "San Nicolás" from the saint's day of that date. The first intimation of abnormal weather previous to this storm was an almost perfect wide quadrant of wind directions extending from the Virgin Islands to Barbados on the morning of the 9th. The appearance at that time was that the area named was in the southwest periphery of a very wide cyclonic area. Broadcasts were immediately sent out in an endeavor to locate the center and

bulletin issued from the San Juan office that morning was as follows:

Advisory 9.00 a. m.—Sept. 10, 1931.—Disturbance of minor intensity has apparently passed through Leeward Islands and is approaching St. Thomas and St. Croix and will probably affect northeastern Porto Rico before midnight. No high winds have so far been reported and the lowest pressure is 29.72 inches at St. Martin. Caution advised small shipping on east coast of Porto Rico particularly.

(Signed) HARTWELL.

Our special observers at St. Croix and St. Thomas sent the required messages and indications pointed to the path

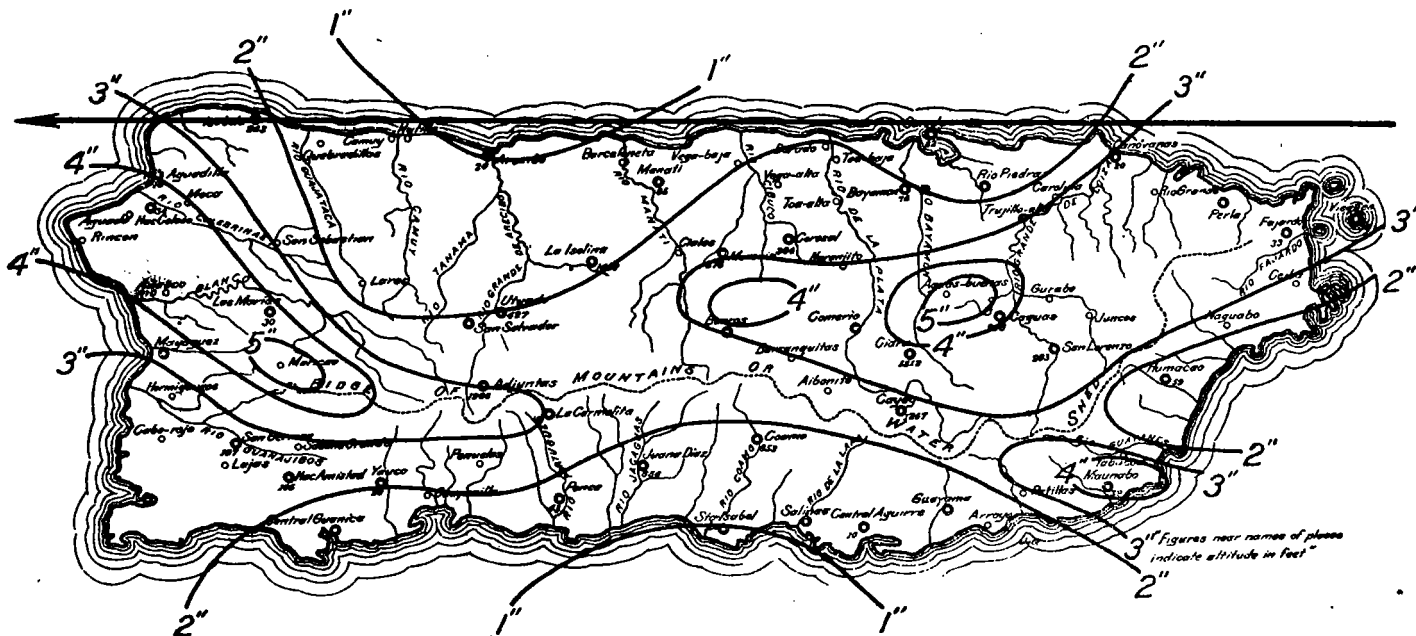


FIGURE 1.—Distribution of rainfall in Porto Rico during hurricane of "San Nicolás," September 10-11, 1931. (Arrow shows path of center)

determine its intensity, but nothing of importance was received and by evening the low area had become elongated in a north-south direction, the southern extremity apparently filling up and the northern developing into a vortex of much narrower limits than at first indicated. Nothing below 29.72 inches (at St. Martin and Antigua) was reported, and no velocities above ordinary occurred within range of reporting stations. By the morning of the 10th the center had passed through the Leewards somewhere near St. Martin and was approaching the U. S. Virgin Islands of St. Thomas and St. Croix. The

slightly north of the latter station, where by mid-afternoon the storm had developed to 60 miles per hour with northwest shifting to west winds and a low pressure of 29.57 inches. By the time it had reached San Juan the intensity had increased to a low pressure of 29.17 inches and an estimated wind velocity of 90 miles per hour. This estimate is based partially upon a stop watch record made by Pan-American Airways (Inc.) officials with their 4-cup Robinson anemometer at the air field and, of course, the total mileage and the dial readings of our own anemometer.

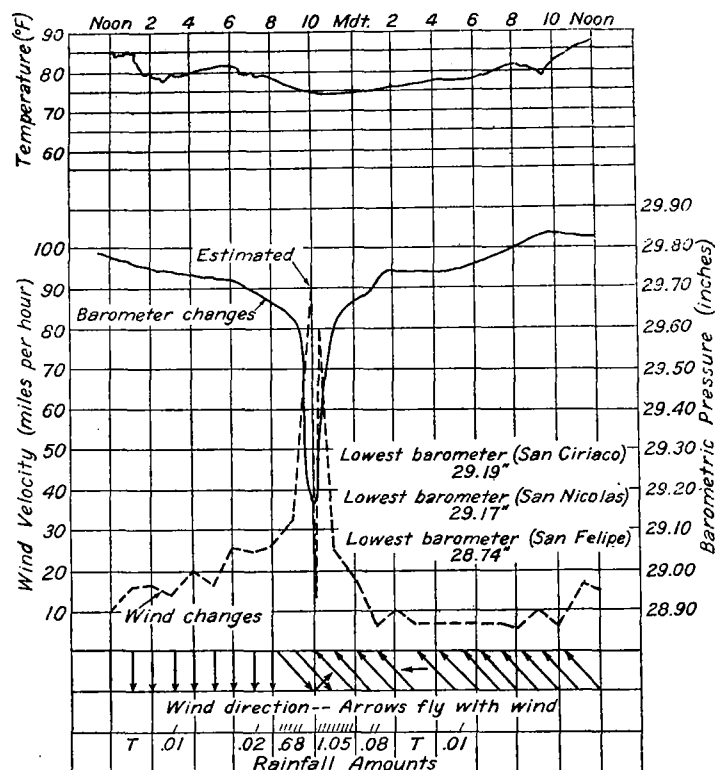


FIGURE 2.—Weather elements at San Juan, P. R., hurricane of September 10-11, 1931

So far the trajectory had been close to west-northwest and in this latitude, with the lowest pressures of the season between the Bahamas and Bermuda it seemed practically certain the storm would continue in that direction, affecting Porto Rico, probably with nothing more severe than heavy rain squalls. From St. Thomas, however, the track bent southward and from the afternoon of the 10th it pursued a due west course for many days, the center

passing along the north coast of Porto Rico, with decreased intensity over Santo Domingo City, then again increasing throughout the remaining length of the Caribbean Sea. This trajectory is shown in the accompanying chart of storm tracks for this area this season.

In Porto Rico, while the information of Thursday evening was perhaps too sanguine, indicating that the center would probably pass as much as 50 miles north of San Juan, the warning of the morning had been well heeded and some preparation was effected where practicable. Two lives were lost and several minor injuries reported in San Juan. Much plate glass and light construction were destroyed, and some 50,000 boxes of fruit blown from the trees. The damage was confined to a strip of 5 or 6 miles in width extending from San Juan to Aguadilla, the damage varying considerably in this area with the character of the crops. The destructive portion of the storm was hardly more than 10 or 12 miles in diameter and the northern half of this was off shore. There was an interval of 15 minutes at San Juan which represented the center of the storm, but it is the opinion of the writer that the actual center passed a short distance north of San Juan as the first renewal of the wind was from the southwest, then after several minutes it became southeasterly. The wind during the first portion of the storm held northwest with practically no variation until the lull.

All electric service was broken and definite news of the passage of the center was sent out through the cooperation of the officials of the Spanish liner *Juan Sebastian Elcano* who communicated the dispatches to the main broadcasting station of the naval radio at Cayey, the local station of that service being badly crippled by both wind and water and their usual land lines to Cayey being down.

A notable feature of the trajectory of all the storms this season has been their close adherence to an east-west course as indicated in the chart, whereas there is regularly a steady deviation toward the north almost from their inception with a recurve as soon as they reach latitudes 18° or 20° .

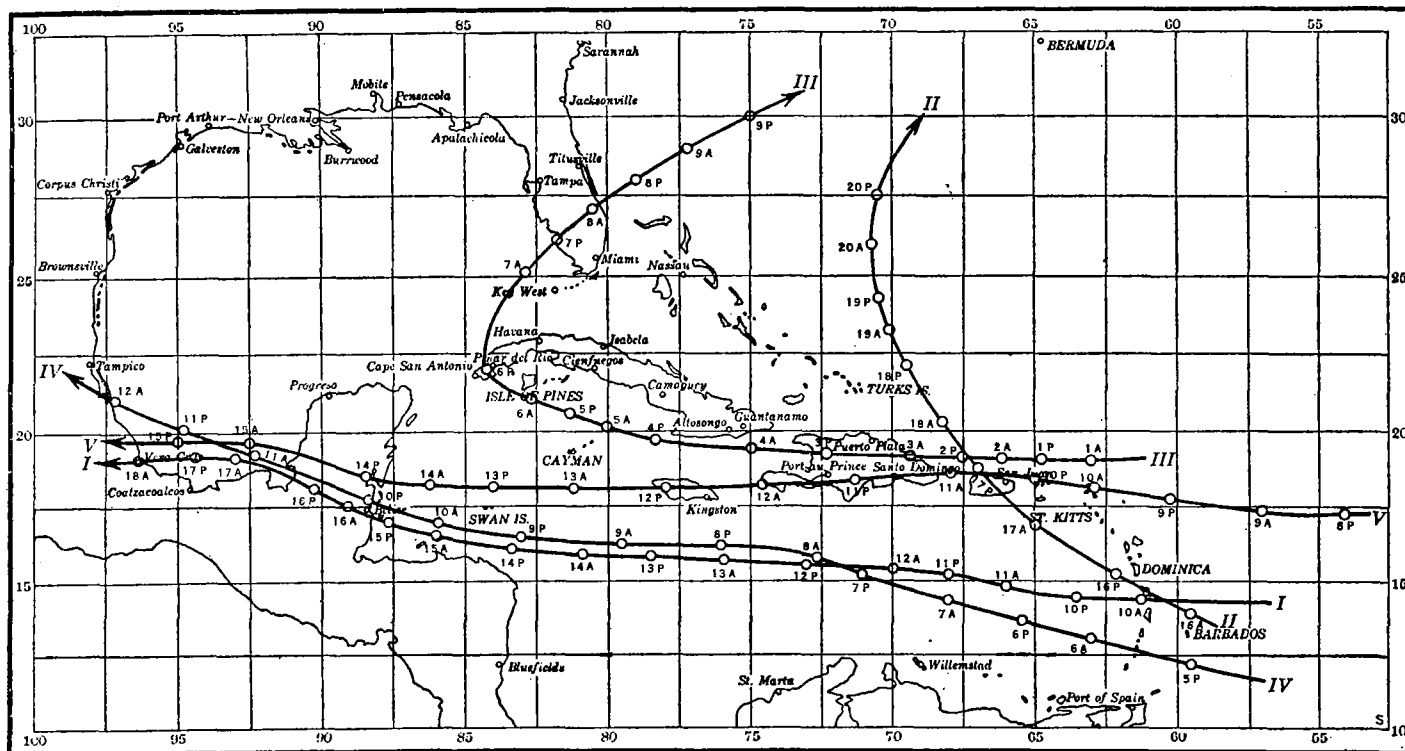


FIGURE 3.—Paths of hurricanes of 1931 (Plotted by Arthur J. Haidle): I, August 10-18; II, August 16-20; III, September 1-9; IV, September 5-12; V, September 8-15 ("San Nicolás")